

Chapter 5

Terrestrial Plants and Animals

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This chapter addresses impacts and mitigation for terrestrial plants and animals. Terrestrial communities are those not directly associated with the shoreline and marine environment. Marine plants and animals involve different issues and, therefore, are discussed in a separate chapter (Chapter 6).

5.1 Primary Issues

Wildlife and habitat protection is a common issue for any project involving removal of forest or other natural vegetation. Areas yet to be mined at the project site contain forests that have grown back after logging, and this forest and surrounding habitats support a variety of wildlife. Many residents have commented that stands of Pacific madrone on the site are important and rare plant communities that provide good wildlife habitat. Others have stated that they enjoy watching wildlife on the site and have noted the presence of interesting species, including northern alligator lizard and western fence lizard.

This chapter addresses the following primary issues:

- Would the project adversely affect a plant or animal listed or proposed for listing under the Endangered Species Act, or other species listed by the state, tribes, or King County as sensitive?
- What would the loss of existing madrone imply in terms of (1) regulations, (2) functional values of madrone forest on the site, and (3) regional distribution of madrone?
- Over the life of the mine, what is the overall effect on habitat of reactivating high-production mining on the site?

5.2 Affected Environment

Existing plant and animal communities at the site have been documented based on:

- a plant and wildlife assessment prepared by Raedeke Associates, Inc. (1998);
- site visits conducted by Jones & Stokes wildlife biologists;
- records from the Washington Natural Heritage Program (WNHP) regarding rare plants and the locations of high-quality native plant communities;
- records from the Washington Department of Fish and Wildlife regarding threatened, endangered, and otherwise sensitive wildlife and wildlife habitat types;
- information from the WDFW Priority Habitats and Species (PHS) database;
- examination of aerial photographs of the site and vicinity; and
- scientific literature and published reports, as cited.

5.2.1 Threatened, Endangered, and other Sensitive Animal Species

5.2.1.1 *Bald Eagle*

The bald eagle is the only threatened or endangered wildlife species that occurs regularly in the project vicinity (the bald eagle is federally and state listed as threatened in Washington). Based on direct observation and on typical bald eagle behavior, bald eagles use the shoreline and surrounding bluffs of the site. Eagles have been seen soaring over the site and perching on the dock and on hillside trees above the shoreline.

The project site is not a particularly high-use area for bald eagles. Bald eagles do not concentrate in this area to feed or seek shelter, but rather use the shoreline as part of larger foraging territories. Although no nest sites exist in the immediate vicinity, bald eagles are wide-ranging and “transient” eagles (those that have not yet established territories or that are wintering or migrating through the area) also use the area. Immature bald eagles, which are often nomadic in their early years, have been seen along the shoreline at the site.

Four bald eagle nests are located between 3 and 6 miles from the site, and individuals from these nesting territories are expected to occasionally use the site's shoreline to forage. The bluff faces are often exposed to winds that create strong updrafts, which are used by bald eagles to gain altitude and glide with little effort. Jones & Stokes biologists have observed such use by bald eagles at the site (as well as similar use by red-tailed hawks). Due to the distance from the nearest nest (more than 3 miles), this site is not considered a major element of any bald eagle nesting territory.

5.2.1.2 Peregrine Falcon

Based on habitat conditions and lack of reported observations, peregrine falcons do not use the site regularly, nor do they rely on the site for survival. Peregrine falcons are known to occur in small numbers throughout the Puget Sound region, particularly during winter. They tend to concentrate where waterfowl and shorebirds concentrate. The site and adjacent shoreline, while likely to be visited from time to time by migrating or wintering peregrine falcons, is not particularly significant habitat. The site provides no peregrine falcon habitat features that are not available at many other locations along the shoreline of Maury and Vashon Islands.

5.2.1.3 Other Sensitive Species and Habitats

King County Policies NE-604 through NE-607 define fish and wildlife habitat and species in order of importance and degree of protection.

- The first level of protection is habitat for "Candidate Priority Species," which *shall not be reduced and should be preserved in Rural Areas and Natural Resource Lands* (such as the site) (Policy NE-604)
- The second level of protection is "Fish and Wildlife Conservation Areas," which should be *protected wherever they occur*.
- The third level is "Candidate Priority Species of Local Importance," which should be *protected outside the Urban Growth Area*.
- The fourth level is "priority species of local importance" and their habitat, as listed by the WDFW, ... which *should be protected outside the Urban Growth Area where such protection is likely to be "most successful"* (Policy NE-605).

The next four sections define these four “tiers” of wildlife species and habitats formally designated by King County. A fifth type of “sensitive” species identified in this section is “species of special concern.” These, while not formally designated by King County, have been identified by other agencies and/or by public scoping comments as “species of concern” and, therefore, require consideration under SEPA.

Habitat for “Candidate” Priority Species. State Candidate species are those fish and wildlife species that will be reviewed by the WDFW (POL-M-6001) for possible listing as Endangered, Threatened, or Sensitive according to the process and criteria defined in WAC-232-12-297.

King County policy NE-604 states that:

King County shall also protect the habitat for “candidate” priority species as listed by the WDFW and found in King County outside of the Urban Growth Area.

In addition to King County Policy NE-604, policy NE-603 states that:

In the Rural Area and Natural Resource Lands, habitats for “candidate” priority species...shall not be reduced and should be preserved.

The King County Comprehensive Plan designates the site as M (mineral), which is a type of natural resource land.

This policy also applies to state or federally listed threatened, endangered, and sensitive species, which are discussed elsewhere (the bald eagle in Section 5.2.1.1 and marine species in Chapter 6).

Pileated woodpecker is the only terrestrial species designated under Policy NE-603 that is present on the site. Pileated woodpeckers most often nest in large Douglas-fir that are diseased or recently dead but still standing. About a dozen such trees are present in a 42-acre stand of mixed madrone/Douglas-fir forest on the northeastern portion of the site, which can therefore be considered suitable habitat.

This mixed stand is suitable foraging habitat and Jones & Stokes biologists have observed pileated woodpeckers in this area. No pileated woodpecker nests have ever been reported on the site. However, because individuals change nest trees each year, they may have nested on the site in the past and/or may nest on the site in the future, although few typical nest trees are present.

Pileated woodpecker home ranges typically range in size between 500 and 1,200 acres. Therefore, the mixed stand represents about 4–10 percent of a typical range of this species. The remaining forest on the site contains some old stumps, but is dominated by madrone and lacks the large Douglas-fir typical of pileated woodpecker habitat. These areas could be used occasionally by pileated woodpeckers.

Purple martin, another “candidate” priority species, was found to be absent. Purple martins nest in cavities (small holes in trees). In the Puget Sound region, they are often found in old pilings along shoreline areas. Dock pilings and the clusters of pilings located adjacent to the dock (structures known as “dolphins”) were searched for evidence of purple martins, yet only European starlings were observed nesting in these structures.

King County Designated Fish and Wildlife Conservation Areas. This section identifies the terrestrial component of “Fish and Wildlife Habitat Conservation Areas.” Fish and other marine components are identified in Chapter 6.

Most of the shoreline of Maury Island, including marine waters and forested bluffs at the site, meet the definition of Fish and Wildlife Habitat Conservation Areas under King County Policy NE-604. This is because the shoreline:

- contains “riparian” habitat in the bluffs;
- is used by bald eagles, which are a threatened species;
- supports eelgrass (see Chapter 6); and
- provides habitat for threatened Puget Sound chinook salmon (Chapter 6).

The King County definition of Fish and Wildlife Conservation Areas also includes “habitat of local importance” for the great blue heron, black-crowned night heron, osprey, and red tailed hawk.

Great blue herons regularly forage along the shoreline of the site and black-crowned night herons and osprey may occasionally forage or rest on the site, but the site does not contain habitat of local importance for these species.

Many people have commented that every species that could be present is significant in and of itself and that impacts need to be addressed in the EIS. While great blue heron regularly forage along the shoreline, and osprey and black-crowned night heron

may be present from time to time, the site is not considered “habitat of local importance.” They do not nest on the site or otherwise depend on the site for survival, but rather use it as part of larger foraging territories.

The King County Comprehensive Plan, the WDFW Priority Species List, and the definition of “habitats of local importance” in the Growth Management Act (GMA) provide the regulatory basis to distinguish mere “presence” from “presence of breeding or other critical habitat.”

As stated in the King County Comprehensive Plan:

... it is important to note that for some species, mere presence is not considered significant. Significant habitats, for some species, are those areas that may be limited during some time of the year or stage of the species life cycle.

The GMA defines Habitats of Local Importance as:

... a seasonal range or habitat element with which a given species has a primary association, and which, if altered, may reduce the likelihood that the species will maintain and reproduce in the long-term ... (WAC 365-190-030).

Finally, the WDFW priority species list provides another definition that distinguishes clearly “mere presence” from “significant use areas.” For this EIS, a significant use of the site was considered to be a use that meets the WDFW definition of a “Priority Area”:

PRIORITY AREA: Species are often considered a priority only within known limiting habitats (e.g., breeding areas) or within areas that support a relatively high number of individuals (e.g., regular large concentrations). These important areas are identified in the PHS List under the heading Priority Area. For example, great blue herons are often found feeding along shorelines, but they are considered a priority only in areas used for breeding. If limiting habitats are not known, or if a species is so rare that any occurrence is important in land-use decisions, then the priority area is described as any occurrence.

These definitions need to be considered when evaluating the onsite status of the four species defined in King County Policy NE-604, as defined below.

Red-Tailed Hawks. Red-tailed hawks have been observed during most site visits conducted by Jones & Stokes biologists and the open areas of the mine provide good hunting habitat. No nest

sites are present, but the site is a regular foraging area. The site contains potential nesting habitat, since it contains relatively isolated forest adjacent to good hunting habitat. Red-tailed hawk territories are up to several miles in diameter, depending on the suitability and dispersion of foraging habitat. Based on the amount of open habitats within about 2 miles of the site (see [Figure 1-2](#)), the site could contain about one-quarter to one-half of the foraging habitat required by one pair of red-tailed hawks. Other hunting areas include open fields that are scattered throughout the island, as well as the shoreline.

Great Blue Heron. Great blue herons do not nest on the site, but do forage along the shoreline, particularly during low tides. Since the nearest nesting colony is more than 2 miles away, the site is likely to be one of many foraging areas located along the Maury/Vashon Island shoreline. The only unusual habitat feature at the site is the dock, which is expected to be used by foraging and resting herons. Herons typically wade in shallow marine waters and in wetlands, but also perch on docks to rest and hunt. Based on the length of shoreline on Maury Island, the site contains less than 1 percent of the available great blue heron foraging habitat on Maury Island.

Black-Crowned Night Heron. This species is found mostly in eastern Washington, but a few individuals nest in western Washington. It is most closely associated with freshwater wetlands. Individuals may visit the site occasionally during winter, but they are not expected to be regular visitors or residents.

Osprey. Osprey may occasionally fly by the site or forage in the waters off the site, but they are not regularly present and do not nest on the site. Osprey nests are typically very obvious stick nests located adjacent to water. None are present on or near the site.

Priority Species of Local Importance. This category is the fourth and final “tier” of species/habitat protection under King County Policy, which specifies that these species be “protected” outside the Urban Growth Area where such protection is likely to be “most successful” (Policy NE-605).

Two species in this category are present on the site: band-tailed pigeon and Columbia black-tailed deer.

Band-Tailed Pigeon. This “priority species of local importance” is notable due primarily to its need for mineral springs (Rodrick and Milner 1991). Band-tailed pigeons are known to feed on madrone berries and seeds, particularly during fall and

winter. Based on breeding bird counts conducted from 1959 to 1988, population levels in Washington have declined roughly 3 percent per year. Population levels have not yet declined so much to warrant consideration of upgrading its status.

Columbia Black-Tailed Deer. This “priority species of local importance” is also present on the site and has been observed regularly by Jones & Stokes biologists. They are relatively common throughout Maury Island, and the site provides habitat that is relatively isolated from human disturbance. Forested areas at the site provide hiding cover and cleared areas provide relatively good feeding areas. Based on historic studies of deer densities in western Washington, prime deer habitat supports from 15 to 50 deer per square mile. Based on that range, the site could support between 5 and 18 deer at any one time. Deer populations fluctuate and deer on the site are expected to travel to other properties as well, so this number is given to provide a general idea of the level of use the site may support.

WDFW and USFWS Species of Concern. In addition to the species formally recognized by King County under GMA, the USFWS and WDFW identify other types of species with declining population levels; that are at the edge of their range; that are important to the public; or that are somewhat rare and/or for which little information is known. These species are not formally designated by King County and receive no legal protection based on the WDFW/USFWS “species of concern” status.

Two species of concern are present on the site: the olive-sided flycatcher and the willow flycatcher.

Olive-Sided Flycatcher. Populations of this species are declining 2.7 percent per year in Washington state (compared with the 3.8 national average) (Sauer et al. 1999). The reasons for this decline are not well understood, but could include loss of wintering habitat in southern latitudes and loss of breeding habitat in the north. Olive-sided flycatchers use tall trees adjacent to open habitats and clearings, and may nest on the site where mining has created open clearings. In breeding bird surveys conducted throughout Vashon/Maury Island, olive-sided flycatcher was the nineteenth most commonly seen species (of a total of 63) (accounting for roughly 2 percent of all bird sightings).

Willow Flycatchers. This species has also been in decline due to loss of habitat (from development and cattle grazing), as well as nest parasitism by brown-headed cowbirds (Rothstein 1994). The species uses dense thickets dominated by willow, red

alder, or vine maple (Sharp 1992). Declines appear to be greater in drier habitats, where breeding is limited to narrow bands of riparian habitat. In western Washington, willow flycatchers remain relatively common (Smith et al. 1997). In breeding bird surveys conducted throughout Vashon/Maury Island, the willow flycatcher ranked 20 of 63 in frequency observed (accounting for roughly 2 percent of all bird sightings). The project site contains some potential breeding habitat for this species in the alder/willow thicket northwest of the existing excavated portion of the mine, and willow flycatchers have been documented on the site along roadside “thickets”.

Cavity-Nesting Birds. Native cavity-nesting birds are not formally designated by King County, but are declining in King County due to loss of mature forest habitat and competition for nest sites by European starlings. Typical cavity-nesting birds in King County include woodpeckers, creepers, chickadees, owls, and nuthatches.

Madrone is used by cavity-nesting birds, but the actual importance of it, particularly in pure stands such as exist at the site, has not been determined. Madrone has been found to be an important component of cavity-nesting bird habitat in Douglas-fir forest of northwestern California. While some have cited this finding as demonstrating that madrone in Washington must have higher populations of cavity-nesting birds than other forest types, some caution needs to be applied.

First, the study found that only 2 of 16 species of cavity-nesting birds actively select madrone over other tree species for nesting: the hairy woodpecker and sapsucker. Second, in the study described, madrone comprised only 7 percent of the stands by number, and 10 percent by basal area (the cumulative area covered by trunks of the trees). The stands at the Maury Island site are mostly pure madrone, and it cannot be assumed that the frequency of use would increase directly with increased madrone frequency. For instance, it is possible that scattered large madrone trees provided nesting sites, but that foraging required Douglas-fir, which is lacking in the pure madrone stands present on the site.

In the DEIS, habitat for cavity-nesting birds was considered marginal, since large snags (standing dead trees) used for nesting were rare on the site. Based on additional analysis, it is clear that madrone is used by hairy woodpeckers and sapsuckers, as well as by other species. Hairy woodpeckers and sapsuckers are primary cavity nesters, meaning they excavate their nests (rather than using existing cavities). Because of this, they probably create nesting

habitat for secondary cavity nesters, such as house wrens and chickadees, which rely on existing cavities. Therefore, the madrone forests on the site are considered to be good habitat for cavity-nesting birds.

5.2.2 Plant Communities and Habitat

5.2.2.1 Overview

About 69 percent of the site (161 acres) contains Pacific madrone and mixed madrone/Douglas-fir forest ([Figure 5-1 through 5-3](#)). Douglas-fir trees on the site range in size from about 6 to 20 inches in diameter and average about 80 feet tall, while the madrone trees range from about 6 to 22 inches in diameter and about 35 to 40 feet tall.

About 31 percent of the site (74 acres) is not forested, including areas where mining and other clearing has taken place. Non-forested areas include areas covered with mixed grasses, invasive shrubs such as Scot's broom, and open ground ([Figure 5-4](#)). Pacific madrone and red alder have recolonized some of these areas and are present in thickets within previously cleared areas.

The project site is used by a variety of mammals, including black-tailed deer, raccoon, bats, Douglas' squirrel, and possibly black bear. Deer mice, voles, moles, and shrews are likely to be relatively abundant. Jones & Stokes biologists have documented 21 species of birds at the site. Within open and disturbed habitats, white-crowned sparrow, rufous-sided towhee, and American robin were fairly common. Red-tailed hawks are also expected to forage within this habitat type (see Section 5.2.1.3). The madrone and mixed Douglas-fir/madrone forests support a variety of birds, including western wood pewee, black-throated gray warbler, orange-crowned warbler, Swainson's thrush, and yellow-rumped warbler. Pileated woodpeckers have been observed in the mixed Douglas-fir/madrone forests and other woodpeckers, such as sapsuckers and hairy woodpeckers, are expected to be present in this habitat type as well.

The site supports at least three species of reptiles. The open, dry, and gravelly habitat interspersed with shrub and grass cover and dense leaf litter from madrone trees provides good habitat for reptiles, including western fence lizard, northern alligator lizard, and terrestrial garter snake. Because the site is quite dry, amphibian use of the site is expected to be limited. Nevertheless, the leaf litter provided by madrone and the dense understory of

salal present in madrone woodlands provide fairly good habitat for salamanders, such as the ensatina and Northwestern salamander. Pacific chorus frogs are the only amphibians that have been documented on the site.

5.2.2.2 Madrone Forest

Current Vegetation on the Site. Madrone forest covers most of the site. There are four distinct madrone-dominated forest communities on the site, as shown in [Figure 5-5](#). Madrone stands have declined greatly throughout King County and Puget Sound (Adams 1999), and Maury Island supports the highest density and largest stands of madrone in the state. The site contains the third largest stand on Maury Island.

Ecological functions of madrone include providing habitat for a variety of birds and providing bank stability on steep slopes adjacent to marine waters. The berries produced each fall are an important food source for many birds, including the band-tailed pigeon, a “species of local importance” designated in King County Policy NE-605. The Washington Natural Heritage Program considers madrone forest a priority for protection under the statewide program to acquire and set aside high-quality native plant communities.

Madrone stands and other plant communities on the site are described in the following paragraphs.

Bluff Madrone Forest (30 acres). Steep slopes (60 to 100 percent slope) facing Puget Sound are covered by stands of pure madrone ([Figure 5-1](#)). Historical and recent aerial photographs show that the bluff slope environment is often disturbed by small, localized, naturally occurring landslides. Madrone seedlings establish on the bare sand and gravel slopes created by these landslides. Over time this allows the bluff forest to become dominated by madrone representing many different size and age classes, from seedlings less than 1 year old to mature trees up to 60 feet tall and 24 inches in diameter. In the northern part of the site, 1944 aerial photographs show that the bluff forest was logged during the late 1930s or early 1940s, so trees in that area are relatively small, with the largest individuals about 30 feet tall and 12 inches in diameter at breast height (dbh).

Madrone Mixed Forest (95 acres). A mixed forest, consisting of more than 80 percent madrone, covers much of the site, particularly in areas south of the old mining area ([Figure 5-2](#)). Historical aerial photographs (1944, 1961, 1965) show that these

areas were partially logged in the late 1920s or 1930s, and later burned (1930s) during a fire that affected much of southern Maury Island. Tree-ring data collected on the site indicate that these madrone started growth in the late 1920s and 1930s. The forest is now dominated by trees 30 to 45 feet tall and 6 to 12 inches dbh, although a few trees are up to 24 inches dbh and more than 50 feet tall. The understory is greatly dominated by salal, which often forms a continuous thicket; evergreen huckleberry; and seedlings or saplings of madrone. The forest contains some relatively open areas, and locally there are young to mature individuals of Douglas-fir.

Douglas-fir Mixed Forest (36 acres). The largest unburned patch mentioned above is a mixed forest dominated by Douglas-fir and madrone in comparable proportions (Figure 5-3). This is a typical madrone forest type, as described by Chappell and Giglio (1994). The understory has a wide variety of shrubs and herbs, including salal, evergreen huckleberry, Himalayan blackberry, hazelnut, sword fern, bracken fern, holly, nettle, trailing blackberry, Scot's broom, fireweed, and elderberry.

Shrubland (32 acres). A parcel that was logged in the late 1930s or early 1940s, and portions of an old gravel mine that was active in the 1940s, are dominated by Scot's broom and various other weeds.

Old Mine (42 acres). Areas of the mine that have been actively worked in recent years have no vegetation or have a sparse cover of weeds, chiefly Scot's broom and Himalayan blackberry (Figure 5-4). Most of the area that was mined during the 1970s contains patches of naturally regenerated young madrone interspersed among Scot's broom and grasses. These trees are 4 to 15 feet tall with multiple stems up to about 4 inches dbh.

Site Vegetation History. Development of the current vegetation cover on the site was studied using aerial photographs flown in 1944, 1961, 1965, 1970, 1978, and 1998. The changes in forest structure during this period are shown in Figure 5-6. Vegetation development on the site has been influenced by a variety of disturbance factors. As noted above, the bluff madrone forest is continuously influenced by small, naturally occurring landslides. These slides probably occur in association with exceptionally severe, prolonged winter rainfall. Such slides occurred in many areas around Puget Sound, including madrone bluffs in the Magnolia neighborhood of Seattle (Adams 1999), during the winter of 1995–1996. These slides commonly remove vegetation along a relatively narrow track that extends vertically

across much of the height of the bluff. By continually exposing new areas of open gravel soil, these slides allow a self-perpetuating bluff madrone forest community to develop. The bluff madrone forest on the site has also been influenced by human activity, which has included logging and gravel mining. Logging denudes the bluff, while mining cuts the bluff back to replace it with lower gradient, relatively stable slopes.

The relatively flat portions of the site, situated on top of the bluff or within the old mine workings, have been influenced by fire, logging, and mining. Large stumps remain on the site, showing that 100 years ago the site was dominated by a conifer forest containing Douglas-fir and western red cedar up to 4 feet in diameter, and a few western hemlock up to 3 feet in diameter. Madrone were probably present but only in small numbers. Old-growth forests with a similar species composition can still be found in areas on Whidbey Island, Fidalgo Island, parts of Point Defiance in Tacoma, and West Seattle.

The big conifers were logged in the early 20th century. This logging may have occurred at different times on different parts of the site. The oldest aerial photographs (1944) show recent clearcut logging in the northeastern part of the site. Most of the rest of the site had recently burned. The fire varied in severity across the site; some places were burned bare of vegetation, but other places appear to have escaped the fire. Generally, fire severity was greatest near the southern edge of the site, and less severe farther north. The 1944 photographs also show an active gravel mine in the basin near the northeastern edge of the site. This mine appears to have started as a large landslide. The mine was active in 1944, but was abandoned by the time of the next aerial photographs, in 1961.

Between 1965 and 1970 mining was initiated in the current pit, which appears as a deep notch cut into the bluff in the 1970 photographs. The 1978 photographs show the mine at its greatest extent, and the current (1998) photographs show that much of the 1978 active mine has become revegetated by patches of madrone and Scot's broom. This revegetation was a natural process; the madrone have become established from seed shed by the surrounding forest and probably carried into the mine pit in bird droppings. Birds, particularly band-tailed pigeons, are among the primary dispersers of madrone seed (Burns and Honkala 1990).

Site Geographic Context. Pacific madrone grows from San Diego County, California to the east coast of central Vancouver Island, British Columbia. It occurs as far inland as the western

Sierra Nevada. In Washington, it is often found along the shoreline of Puget Sound and on southern slopes of the western Cascade Mountains (Burns and Honkala 1990).

The WNHP has identified 23 madrone stands on its database of high-quality ecosystems in Washington. These stands are mostly in the Puget Sound area, and they range in size from 12 to 207 acres. The two largest stands are on Maury Island. A stand covering 207 acres is found on public and private land in the vicinity of Maury Island Park, about 2 miles northeast of the study site. Another stand of 90 acres is found on private land in the Manzanita neighborhood on Maury Island, about 1.5 miles southwest of the study site.

The two inventoried sites on Maury Island were visited during January 2000 and found to have forest structure and species composition comparable to what is found on the study site. Like the study site, they contain madrone of many different sizes, mixed with varying numbers of Douglas-fir.

Madrone Decline. Several public comments on the DEIS have expressed concern that the Pacific madrone ecosystem is in decline in the Puget Sound region in general, and that this decline may threaten the forest on the study site.

Madrone stands were once common along the shores and bluffs of Puget Sound and within recently disturbed areas close to such bluffs. However, development and, recently, disease have greatly diminished this plant community so that now “madrone plant associations are rare in relatively natural conditions and uncommon in a more disturbed condition” (Chappell and Giglio 1999). Mature madrone forests at the site are in a natural condition.

By far the most common cause of madrone decline is development, since madrone grows on the same shoreline areas that attract human development. Much development on Maury and Vashon Island has occurred along shorelines that were likely once dominated by madrone stands similar to those found at the proposed mining site (see Figure 1-2).

Recently, however, remaining madrone stands have been declining due to disease. Disease usually strikes disturbed stands and individual trees in urban situations rather than pure stands such as those found at the site. The stands at the site appear healthy.

Recent studies have found that fungal diseases primarily affect isolated madrone in urban landscapes (Elliott 1999, Bressette and Hamilton 1999). The primary causes of madrone decline due to disease appear to be root damage (usually by surrounding the tree with a lawn) and stand fragmentation (usually in connection with residential development) (Bressette and Hamilton 1999, Adams et al. 1999). Since the site is currently dominated by a continuous madrone forest, there is no reason to expect the site to be at risk for madrone decline due to fungal disease. Most madrone trees on the site are currently healthy, although (as in any forest, regardless of tree species) some individuals are unhealthy or have recently died.

5.3 Impacts

5.3.1 Would the project adversely affect a plant or animal listed or proposed for listing under the Endangered Species Act, or any other species listed by the state, tribes, or King County as sensitive?

5.3.1.1 *Proposed Action*

Threatened and Endangered Species. Peregrine falcon and bald eagle, the two federally listed species present in the area, are not likely to be significantly affected by the project because no key habitat (e.g., nests) would be affected.

In Washington, bald eagles are protected under the Bald Eagle Protection Rules. These rules protect nest sites and communal roosting areas (communal roosting areas are typically protected forest stands where more than three eagles spend the night, generally during winter). The site contains neither bald eagle nest sites nor roosting sites, so the state law does not apply.

Bald eagles would probably alter their behavior to avoid mining and barge-loading areas; however, several factors moderate this impact:

- Similar shoreline foraging habitat is abundant in the area, and no nest or roost sites would be disturbed.
- Puget Sound bald eagles are fairly well adapted to human activities, so long as shoreline habitat and nest sites are not disturbed. Bald eagles on Vashon Island and throughout Puget

Sound exist within areas of relatively high development. They have adapted to boats, cars, airplanes, helicopters, homeowners, joggers, and kayakers, among many other disturbances.

- The project is not a particularly high-use area for bald eagles. In other words, it is not an area where eagles concentrate to feed or seek shelter, but rather is part of much larger bald eagle foraging areas that can cover several square miles.
- Bald eagles are expected to still use perches and the shoreline area under the Proposed Action, even during periods of active mining. During periods of relative inactivity at the mine site, as would be expected to occur under the Proposed Action, bald eagle use and habitat would be essentially the same as it is now.

Since peregrine falcon visits to the site are expected to be rare, and no nest sites or key foraging areas are present, peregrine falcons are not likely to be affected by the project.

Fish and Wildlife Habitat Conservation Areas. The shoreline of most of Maury Island, including the site, meets the definition of a King County Fish and Wildlife Habitat Conservation Area. Active mining would remove habitat and cause noise and activity that could disturb bald eagles, which are listed as threatened. The use is not expected to significantly affect individuals, as described in the preceding paragraph. Mining would also reduce the area of the existing bluffs by up to 50 percent. These areas are considered riparian habitat (and, therefore, meet the criteria for Fish and Wildlife Habitat Conservation Area) since trees from these bluffs contribute wood and organic material to the shoreline and associated waters.

Great Blue Heron. The Maury Island heron rookery, 2 miles northeast, and the Dumas Bay rookery, 4 miles southeast, are located too far from the site to be impacted by the Proposed Action. Herons from these two colonies, as well as migrant herons and others, are expected to forage on the shoreline areas of the site. However, WDFW focuses protection on breeding, rather than feeding areas, as stated in their Priority Species List: “great blue herons are often found feeding along shorelines, but they are considered a priority only in areas used for breeding.”

Hérons’ use of the site would be expected to decrease due to disturbance, but herons are relatively well adapted to feeding near human activities (e.g., herons are common at the Ballard Locks

within the City of Seattle), and they are expected to continue to forage at the site.

Black-Crowned Night Heron. This species is not expected to use the site with any frequency and, therefore, would not be adversely affected.

Osprey. Since no nest is located near the site, project impacts would be limited to disturbance of foraging, resting, or traveling individuals. Osprey are not particularly sensitive to disturbance (many nests occur in urban situations or along roadsides), so the overall effect of the project on this species is expected to be minimal.

Red-Tailed Hawk. Active mining would reduce suitability for red-tailed hawk foraging in active portions of the mine, and mining would eventually remove mature forests that provide potential nest sites. Overall, mining would maintain suitable foraging habitat, since areas reclaimed by hydroseeding would provide good hunting habitat.

Pileated Woodpecker. Based on pileated woodpecker home range sizes, mining at the site would eventually remove between 4 and 10 percent of the foraging territory for a breeding pair. The pileated woodpecker is a “candidate” priority species that is present on the site. Most of the typical habitat onsite is located within a 36.3-acre stand of mixed Douglas-fir/madrone forest on the northeastern portion of the site. Most of this stand (33.6 acres) would be cleared due to mining.

Per King County Policy NE-603:

In the Rural Area and Natural Resource Lands, habitats for “candidate” priority species ... shall not be reduced and should be preserved.

Loss of this patch without compensation would be counter to this policy.

Band-Tailed Pigeon. Up to 139 acres of band-tailed pigeon foraging and nesting habitat would be removed over the course of mining, leaving about 22 acres of suitable habitat along the shoreline bluffs and perimeter buffer. Since band-tailed pigeon nesting areas can include defended territories up to 1 mile in radius (Brown 1985), this impact would reduce breeding habitat for a few pairs at most. The primary impact would be the loss of fall foraging habitat. Band-tailed pigeons are known to feed on

madrone berries in the fall, prior to migrating south. Some band-tailed pigeons remain all winter (and some travel south to this area to winter), and wintering band-tailed pigeons are strongly associated with madrone (Chappell and Giglio 1999). During non-breeding periods, band-tailed pigeons tend to flock and range widely, so the site is probably part of larger foraging territories. Since madrone is in decline, loss of madrone on the site could contribute to declines in band-tailed pigeon populations.

Columbia Black-Tailed Deer. Deer would avoid active mining areas, including steep slopes containing only sand. Noise and activity would cause them to stay away from conveyors, excavating equipment, trucks, and people. Removal of mature forest would reduce hiding and fawning habitat. Fawning may still occur in the densely forested slopes that receive little human disturbance. Foraging habitat would increase during the early stages of reclamation, and deer foraging may actually interfere with revegetation. In addition, since much of the site would be off-limits to people and would not be developed, the site would still serve as a refuge for deer. Deer may bed in remaining forests on the site during the day, and then forage on the site and in surrounding areas at night. Such use is typical of deer in rural areas.

Olive-Sided Flycatcher. Olive-sided flycatcher nests could be destroyed during clearing, if tall trees adjacent to open habitats and mining areas are removed during the breeding season (generally April through June). Seasonal restrictions or bird surveys could avoid this impact (Section 5.4.3.14). Overall, habitat for this species may increase over the life of the mine, as reclamation areas sprout young, open plant communities adjacent to the forested site buffer, presenting good potential habitat for this species.

Willow Flycatcher. As with the olive-sided flycatcher, the greatest potential impact to willow flycatchers would be direct removal of nest sites, if any exist, during clearing. Again, seasonal restrictions or bird surveys could greatly reduce the potential for this impact (Section 5.4.3.14). Reclamation areas would provide willow flycatcher habitat after about 5 to 20 years. Subsequently, overstory trees would predominate on most areas, assuming reforestation efforts take place successfully. It is likely that some willow or alder thickets would persist onsite.

Cavity-Nesting Birds. Forest clearing would remove about 139 acres of cavity-nesting bird habitat over the life of the mine. Using the average density of nests found in Douglas-fir/madrone

forest in Oregon (1.7 pairs per acre), this would represent a loss of habitat for 236 pairs of cavity-nesting birds. Hairy woodpeckers and red-breasted sapsuckers would be most affected. Removal of forest would delay the eventual development of habitat for cavity-nesting birds by about 50 years, since reclaimed areas would take at least that much time to develop conditions similar to those currently present onsite.

5.3.1.2 Alternative 1

Impacts would be the same as under the Proposed Action. Since mining would likely progress at a slower rate than under the Proposed Action, so too would the loss of forest and other habitats.

5.3.1.3 Alternative 2

Impacts would be the same as under the Proposed Action, but, as with Alternative 1, the project would last longer and nighttime activity and disturbances would be less.

5.3.1.4 No-Action

The current operation is having little or no effect on the bald eagle or peregrine falcon. Continued clearing would have similar impacts as the Proposed Action, but clearing would take place at a much smaller scale and slower pace and over a longer time.

5.3.2 What would the loss of existing madrone imply in terms of (1) regulations, (2) functional values of madrone forest on the site, and (3) regional distribution of madrone?

5.3.2.1 Proposed Action

Overview. Over the life of the mine under the Proposed Action, up to 105 acres of madrone-dominated forest would be removed, and an additional 34 acres of forest and woodland where madrone is codominant would be removed. This represents 84 percent of madrone-dominated forest on the site and 93 percent of madrone-codominated forest. The remaining forest on the site would be located within 50-foot-wide buffers along the northern and western edges of the site, and within a 200-foot-wide buffer along the shoreline ([Table 5-1](#)).

As proposed, mined areas would be revegetated by hydroseeding with mixed grasses and Douglas-fir. It is likely that madrone would naturally regenerate in parts of the previously mined areas after revegetation with Douglas-fir and grasses. This assumption is based on several factors.

1. Areas mined during the 1970s are now naturally regenerating with madrone. The regenerating trees are mostly 4 to 15 feet tall with a multi-trunked, shrub-like appearance. This is normal for open-growth madrone (Chappell and Giglio 1999). The trees are very healthy, and are expected to grow 1 to 3 feet per year. However, coverage is patchy; some areas still have no vegetative cover, and others are covered mostly by Scot's broom and other invasive weeds.
2. Madrone regenerates primarily by seeds, dispersed mainly through the droppings of birds, rodents, and deer, all of which are present on the site. Moreover, "[t]he most favorable seedbed for establishment seems to be bare mineral soil free from all, or nearly all, organic material" (Burns and Honkala 1990). At a gravel mine, bare mineral soil seedbeds are very common.

Thus, madrone would likely compete vigorously with the Douglas-fir seedlings and seeded grasses introduced at the completion of mining activities under the Proposed Action, and would likely become re-established over parts of the mined area. Nevertheless, under the project as proposed, much of the existing madrone forest would be lost.

Regulations. Clearing of madrone (assuming Best Management Practices) is not prohibited by law, since madrone trees are not protected under the Endangered Species Act, King County Sensitive Areas Ordinance, or other county, state, or federal laws or regulations. All clearing would be performed in accordance with WDNR Forest Practices Rules.

However, the King County Comprehensive Plan (1997) states that "The County shall strive to maintain the existing diversity of species and habitats in the County." Moreover, the plan specifically favors high diversity of native species (King County Policy NE-601). Although madrone forest is one of the most common vegetation types on Maury Island, it is relatively uncommon within the County as a whole, so conversion of the site to any other type of vegetation would likely constitute an incremental loss of biodiversity.

Functional Values. Clearing would temporarily remove habitat for several common species of wildlife, as well as some declining species, such as band-tailed pigeon, and would reduce other benefits of forest, including production of oxygen, visual enhancement, and human use and enjoyment of madrone forests.

Regional Distribution. As noted above, the largest remaining madrone stands in the region are on Maury Island, northeast and southwest of the site. The stand northeast of the site is largely within Maury Island Park. Other relatively large and healthy stands are preserved in parks just across Puget Sound at Magnolia, Discovery, and Lincoln Parks in Seattle and at Point Defiance Park in Tacoma. There are also many stands preserved on public lands to the north, such as an exceptional stand on Jones Island in the San Juan Islands.

On Maury Island, the two high-quality madrone stands recognized by WNHP have an aggregate area of 297 acres. The proposed project site has about 161 acres of forest in which madrone is a major component. The Proposed Action (without mitigation) would cause the loss of one of the largest remaining madrone stands on Maury Island (assuming maximum clearing). Parts of that total would be permanently converted to Douglas-fir forest and grassland under the proposed reclamation plan.

5.3.2.2 *Alternative 1*

The factors regarding madrone forest removal considered for the Proposed Action would also apply to Alternative 1. Reduction of night barging and lower maximum mine production rates would likely result in slower removal and restoration of forest, but, ultimately, the same result as the Proposed Action.

5.3.2.3 *Alternative 2*

Same as Alternative 1, but with an expected slower rate of forest removal and restoration.

5.3.2.4 *No-Action*

Should the Applicant be restricted to only current levels of mining, madrone would be cleared very slowly as mining progresses so that natural regrowth of madrone would likely keep pace with clearing. Regrowth may be patchy due to lack of active restoration efforts. Forest may be cleared in patches up to 32 acres as new mining phases are initiated.

5.3.3 Over the life of the mine, what is the overall effect on habitat of reactivating high-production mining on the site?

5.3.3.1 Proposed Action

By reactivating high-volume extraction and barging, wildlife habitat loss would accelerate and more area would be affected at any given time. Wildlife would be affected in three general ways: habitat loss, habitat alteration, and disturbance from noise and activity.

Habitat Loss. At any one time, up to 205 acres of the site would be of little value to wildlife. This area includes the active mining area and areas with less than 10 years of reclamation. Mined out areas would be subject to ongoing reclamation, and forest would take up to 70 years to reach the maturity of existing mature forest on the site. Roads and other facilities on the site would also provide little wildlife habitat. If the site were mined at maximum levels, then the entire site, save for buffers, could be converted to essentially bare gravel in 11 years.

Habitat would exist within the vegetated buffer surrounding the site, within areas yet to be mined, and within reclaimed areas. The buffers surrounding the site would support some breeding birds and other wildlife, although species that require interior forest habitats (e.g., warblers, flycatchers, and large mammals, such as bear) would leave these areas, once clearing to the buffer edge had been completed.

Areas yet to be mined would provide similar habitat to that which is present now. This habitat would be gradually removed over the life of the mine, followed by revegetation on reclaimed areas (until subsequent human use of the site, if any). As stated elsewhere, the faster mining progresses, the faster forest would be removed.

Habitat Alteration. Reclaimed areas would provide different habitat values, depending on the site's age and other factors, such as slope, exposure, surrounding vegetation, and reclamation treatments and techniques. Initially, reclaimed areas would provide a seedbed for a variety of plants, including native plants, invasive plants, and plants seeded or planted as part of reclamation efforts.

Areas under reclamation could be quite productive in terms of plant growth and diversity and may attract deer, small mammals, and other foraging animals. (Wildlife foraging could, in fact,

hamper restoration efforts. Monitoring and subsequent protective measures could effectively reduce this potential problem.)

With increased mine production levels, larger areas would be in early reclamation. At maximum production, the whole site could be converted to young vegetation.

As proposed, the Applicant would hydroseed slopes and plant the floor of the mine with Douglas-fir (Figure 2-3). This would probably not restore madrone forest on the site, although some madrone would likely grow on the grassy slopes. Should this be the case, then species adapted to shrubby and grassy habitats would predominate on the slopes, and forest-associated species would utilize the floor of the mine where Douglas-fir forest had been established. Overall, the site would still provide wildlife habitat, but for a different complement of species, with more common species such as American robin, northern flicker, white-crowned sparrow, and American crow, and fewer forest species, such as woodpeckers, creepers, and chickadees.

If left uncontrolled, some reclaimed areas could develop stands of Scot's broom, mixed grasses, and other weedy species that provide poor wildlife habitat. This has occurred on some areas of the existing site. However, little active reclamation has taken place on the site following past mining activities because it was expected that the existing cleared areas would be subsequently mined as the site excavation expands. Slopes were seeded to maintain stability and meet standards, but were not actively restored to forest or controlled for weeds.

Specific mitigation measures, performance standards, monitoring, and contingency plans could prevent or minimize undesirable vegetation within reclaimed areas (see Section 5.4).

Assuming monitoring and restoration efforts occur, native plant communities, once established, would develop over time and become similar to existing forests in about 60 years. Madrone, Douglas-fir, willows, and a variety of ground plants, such as bracken fern, evergreen huckleberry, elderberry, and ocean-spray, would take hold if competition from invasive plants were not too intense or if invasive plants were controlled by active removal.

Between the time that native plants become established and when they reach current site conditions, plant communities would go through a maturation process that provides differing habitat values as the community grows. Initially, deer, small mammals, and other wildlife may be attracted by the initial flush of green vegetation.

Vegetation would become dense as shrubs and sapling trees grow, becoming suitable for some nesting birds (e.g., rufous-sided towhee, song sparrow, dark-eyed junco) and a variety of small mammals. Red-tailed hawks and bald eagles may also use these open areas to forage. As trees develop, they would begin to shade out some of the shrubs, eventually developing a forested overstory with moderate shrub growth below, similar to existing forests.

Effects of Disturbance. Noise and other activities would cause some wildlife to leave or avoid adjacent habitats that would otherwise be suitable. Noise associated with mining in the upland areas of the site would include heavy equipment, the conveyor system, and vehicles and trucks. Some animals are more sensitive than others, and it is difficult to predict exactly which species would avoid the area. Animals that occur in and around the existing developments on the island would likely be the same species that occur near activities at the mine.

5.3.3.2 *Alternative 1*

Habitat loss would be the same as under the Proposed Action, but clearing and restoration would likely progress at a slower pace. Since the project would likely last longer, impacts associated with disturbance would also last longer. Without much nighttime activity under Alternative 1, as compared to the Proposed Action, disturbance would be much less at night, and nighttime wildlife use of the site and surrounding lands may be greater than under the Proposed Action.

5.3.3.3 *Alternative 2*

Same as Alternative 1, only with a further reduction in mining capacity and associated decrease in the pace of mining across the site.

5.3.3.4 *No-Action*

Should the operation continue as it has over the past 20 years, then the rate of habitat loss would be much less than as proposed, with many portions of the site and associated habitats remaining unmined indefinitely.

5.4 Adverse Impacts and Mitigation

5.4.1 Significance Criteria

King County considers the following as indicators of significance for impacts on plants and animals under SEPA.

- Causing an unmitigated loss of nest sites or other key habitat (such as regular perch trees) for:
 1. Federal or state listed endangered or threatened species;
 2. Priority or candidate priority species of local importance;
 3. Species of local significance as defined by the King County Comprehensive Plan;
 4. Wildlife networks designated by King County; or
 5. Priority Habitats as defined by the state.

5.4.2 Measures Already Proposed by the Applicant or Required by Regulation

- a. Revegetation. As outlined in the reclamation plan submitted by the Applicant to WDNR, mined areas would be revegetated with Douglas-fir along the relatively flat floor of the excavated mine and with seeded grasses and forbs along the steeper slopes grading down to the floor. See Chapter 2 for further details on the proposed reclamation plan.
- b. Per KC 21A.38.150 (groundwater protection special district overlay), “at least 40 percent of the site must remain in natural vegetation or planted with landscaping to maintain predevelopment infiltration rates for the entire site.”
- c. Wetland Creation. Following completion of the project, the Applicant has suggested that a small wetland community could be planted around the retention pond at the foot of the slope. The created wetland would be designed using best design practices and planted with native plant species. To support amphibian use of the wetlands for reproduction, the created wetland would be designed to minimize substantial fluctuations in the level of the water surface during the breeding season.

If, as recommended in Chapter 4, the Applicant were to establish several water collection areas rather than a single retention pond, then similar wetland and/or moist-habitat plant communities could be established to support amphibian use.

- d. **Soil Augmentation.** To address public safety concerns regarding arsenic, the Applicant is proposing to fully contain most topsoils at the site within a sealed berm. At full capacity (when mining is complete), the berm would measure up to 30 feet high and 2,100 feet long. No topsoils would be removed from the site.

Because most existing topsoils would be unavailable for reclamation, either soils manufactured onsite, or offsite soils, or a combination of these two materials would be used to establish planting soils. Onsite topsoils would be prepared using composted and/or mulched organic matter (from cleared vegetation) added to non-contaminated till and/or sands. Additional soils and/or organic materials would be brought in as necessary to assure that reclamation performance standards are met. Reclamation performance would be monitored by the WDNR, under their statutory jurisdiction over mining reclamation within the State of Washington.

Specific test plots may need to be established to determine the appropriate mix of organic material and/or augmented soils. For example, where madrone is to be established, large amounts of organic material would not be appropriate since this species prefers mineral-rich soils with relatively little organic matter.

5.4.3 Remaining Adverse Impacts and Additional Measures

5.4.3.1 Terrestrial Impact 1. Long-Term Loss of Madrone Forest

Specific Adverse Environmental Impact. The project objectives cannot be achieved without removing topsoils and clearing madrone forest.

Direct Clearing. As proposed, over the life of the mine 138.5 acres (85 percent) of the existing mature madrone forest would be removed ([Table 5-1](#)), including:

- 16.7 acres (56 percent) of bluff madrone forest;

- 88.2 acres (93 percent) of mature madrone mixed forest; and
- 33.6 acres (93 percent) of mature Douglas-fir mixed forest.

This loss would be mostly permanent under the Applicant's proposal, because the Applicant proposes to replant mined areas with Douglas-fir and grasses. In addition, the proposed grading plan would result in a large, flat basin floor, and madrone does not recolonize well on flat surfaces. Although some madrone would likely recolonize mined-out areas, the overall effect would be to permanently convert existing mature madrone forest into Douglas-fir forest and open slopes supporting a mix of grasses, weeds, and shrubs.

Buffer Loss. Clearing for fencing, wind damage, and reduced vigor due to fragmentation could cause the loss of about 6.4 acres of mature mixed madrone forest and 2.7 acres of mature Douglas-fir mixed forest in buffers.

Time Lag in Reforestation. The Applicant proposes a phased mining sequence that impacts mature madrone forest first (Phases 2, 3, and 4), and impacts the highly disturbed shrubland last (Phase 6). This would result in a temporary net reduction in madrone forest cover.

In addition, at maximum rates of extraction, the entire mining footprint, or 85 percent of the existing madrone forest, would be cleared in about 11 years. This would create a major time lag between the time of the impact and implementation of mitigation measures. About 204 acres (87 percent) of the site would be essentially bare, and the mitigation measures would be less effective.

5.4.3.2 Terrestrial Mitigation 1

- a. Revegetate completed phases with madrone forest, rather than Douglas fir or hydroseeding. Achieving this goal would require control of invasive weeds, seeding with madrone seed gathered from onsite forests, and planting shrubs (chiefly salal and evergreen huckleberry) grown from stock gathered onsite (but not from buffer areas). Innovative techniques, such as placement of perch poles (for dispersal of seeds through birds) and mounding of seed beds, could improve results.
- b. Prohibit hydroseeding except where necessary to control erosion, and use only native seed mixes. In this context, "native" requires that all seed stock be derived from the Puget

Sound area. Contract growing of seed gathered within 20 miles of the site is preferred.

- c. Define specific mitigation performance standards in a Revegetation and Monitoring Plan, to be prepared by a qualified specialist in habitat restoration, and reviewed and approved by King County.

Performance standards could be refined during plan development, but should be reasonably achievable within about 10 years, assuming typical madrone growth. For example, if typical growth were about 1 foot per year, a possible performance standard could be a minimum 50 percent madrone canopy coverage, with an average tree height of 10 feet per stand.

Stands of relatively uniform cover should be delineated so that cover averaging does not result in a patchy distribution of madrone (e.g., 50 percent cover could be achieved with 100 percent cover on 50 acres and no cover at all on another 50 acres).

- d. Monitor restoration to ensure that performance standards are being met.
- e. Implement efficient monitoring and County review so as not to cause unnecessary delays that would unduly hinder project objectives. For efficiency, revegetation targets could be defined as part of the periodic review that is required for mining sites per KCC 21A.22.050. Periodic review is conducted at least every 5 years at all mineral sites to determine whether “the site is operating consistent with the most current standards and to establish other conditions as necessary to mitigate identifiable environmental impacts”.
- f. Since mining would occur in phases (per KCC 21.22.060), plan, implement, and monitor reclamation in phases (including both interim and final reclamation).
- g. Control Scot’s broom and Himalayan blackberry to prevent them from invading cleared areas.
- h. Alter phased mining sequence so that highly disturbed shrubland ecosystems are mined early in the process, thus releasing these areas for revegetation to begin. In addition, phase mining so that mining would cross each area only once, where possible. Where not possible, interim site stabilization measures should be limited to erosion control.

- i. Do not regrade the floor of the mine into a large, flat basin, on which madrone does not recolonize well. Instead, create gentle undulations and mounds up to a few feet high to improve colonization and survivability of madrone seedlings.
- j. To prevent a major time lag between impacts and mitigation, establish a minimum number of acres that must be maintained as madrone forest at any one time, using the specific performance standards developed in the Revegetation and Monitoring Plan (e.g., minimum 50 percent madrone canopy coverage, with an average height of 10 feet per stand).

A reasonable acreage to be maintained in madrone forest may be determined by subtracting the minimum area required for large-scale mining from the entire site area.

For example, at any one time, large-scale mining would require about 84 acres (36 percent) of the site to be cleared or sparsely vegetated, based on :

- 32 acres for the active mining phases (based on King County Code limitations);
- 32 acres being actively restored; and
- 20 acres for roads, loading areas, processing equipment, conveyer system, electrical lines, office, storage, and other project features.

This would leave up to 151 acres available for madrone forest while still allowing large-scale mining at the site. This 151 acres would be composed of (1) mature forest preserved in buffers and set-aside areas; (2) madrone in areas yet to be mined; and (3) restored madrone forest.

- k. Do not cut trees within buffer areas except in rare cases for hazard tree removal. Prune newly exposed Douglas-fir trees that provide important screening to reduce “sail” and associated vulnerability to blowdown.
- l. Increase buffer where practical based on existing topography and mining needs to reduce vulnerability of buffer forest trees to death and disease. Alternatively, increase standard buffer from 50 feet to 100 feet.
- m. In buffer areas dominated by Himalayan blackberry, Scot’s broom, or herbaceous weeds, remove vegetation and replant with native trees and shrubs characteristic of madrone forest.

Regulatory/Policy Basis for Condition. King County does not have a specific policy to protect madrone forest, and, as stated in Section 5.3.2.1, madrone is not protected by county, state, or federal regulations.

Still, several policies formally designated by King County provide a basis for considering ways to minimize loss of madrone while attaining or approximating the proposal's objectives.

King County has a long-standing policy of promoting native plants. As stated in the Comprehensive Plan, protection of many types of wildlife (and associated plant communities) does not have to be at odds with development. Because much of the mining site would remain undeveloped during the life of the mine, many opportunities exist for habitat enhancement and preservation, and implementing such opportunities would be consistent with King County Policy, including NE-503, which states:

The use of native plants should be encouraged in landscape requirements, erosion control projects, and in the restoration of stream banks, lakes, shorelines, and wetlands.

In addition, NE-612 states:

Incorporating native plant communities should be encouraged where possible into development proposals.

While not formally designated by King County as a "Fish and Wildlife Habitat Conservation Areas," madrone is used by band-tailed pigeons (observed on the site by EIS Team members), which are a "priority species of local importance" (King County Policy NE-605). The Policy states that:

King County should protect all priority species of local importance and their habitat ... where they are likely to be most successful.

Band-tailed pigeons are not particularly rare but they are declining, and their presence at the site provides additional policy basis to require that loss of madrone forest be minimized through mitigation (Sections 5.4.3.3 and 5.4.3.4).

In addition, the WNHP identifies madrone forest as an important native plant community, and Maury Island contains some of the largest stands in the County. Madrone forest provides wildlife habitat, visual and aesthetic values, as well as contributing woody debris to shoreline areas.

Terrestrial Mitigation 1(f), which is to require revegetation planting and monitoring on a phase-by-phase basis, is based on policy RL-413, which states, in part:

Where mining is completed in phases, reclamation also should be completed in phases as the resource is depleted.

This measure is also intended to respond to public concerns regarding the feasibility of restoring madrone forest on the site.

5.4.3.3 Terrestrial Impact 2 – Loss of Band-Tailed Pigeon Habitat

Specific Adverse Environmental Impact. Up to 139 acres of Band-tailed pigeon foraging and nesting habitat would be removed over the course of mining, leaving about 13 acres of suitable habitat along the shoreline bluffs and 9 acres in perimeter buffer. Since band-tailed pigeon nesting areas can include defended territories up to a 1-mile radius (Brown 1985) this impact would reduce breeding habitat for a few pairs at most. The primary impact would be the loss of autumn foraging habitat.

5.4.3.4 Terrestrial Mitigation 2

- a. Increase the amount of madrone retained or restored on the site to reduce band-tailed habitat loss. Retention of additional portions of the bluff, as described in Chapter 11 (Figure 11-8), would maintain an additional 9 acres of existing madrone. Retention of some or all of the mature madrone/Douglas-fir forest patch (Terrestrial Mitigation 3) would retain up to 36 additional acres. With both measures, up to 58 acres of habitat could be retained.

Increasing buffers and set-asides greatly reduces the amount of material available to be mined. Slope and grading requirements reduce mineral availability in a greater proportion than the area set aside. For example, a 20 percent reduction in area could reduce up to 50 percent of available minerals. Because of this, reducing the allowable mining area compromises the project objectives, and, at some point, becomes an unreasonable alternative per WAC 197-11-786.

- b. Restore madrone on reclaimed areas to gradually replace lost band-tailed pigeon habitat (per Terrestrial Mitigation 1). Madrone begin producing berries within 5 years of age.

Regulatory/Policy Basis for Condition. Same as listed under Terrestrial Impact 1.

5.4.3.5 Terrestrial Impact 3 – Loss of Habitat for Pileated Woodpecker

Specific Adverse Environmental Impact. Based on pileated woodpecker home range sizes, mining at the site would remove between 4 and 10 percent of the foraging territory for one breeding pair. The pileated woodpecker is a “candidate” priority species that is present on the site. Most typical habitat onsite is located within a 36-acre stand of mixed Douglas-fir/madrone, located on the northeastern portion of the site. Most of this stand (34 acres) would be cleared due to mining.

Per King County Policy NE-603:

In the Rural Area and Natural Resource Lands, habitats for “candidate” priority species ... shall not be reduced and should be preserved.

Therefore, loss of this patch would be counter to this policy.

5.4.3.6 Terrestrial Mitigation 3

Set aside some or all of the 36-acre stand of mixed Douglas-fir and madrone to maintain the best habitat for pileated woodpeckers on the site. This measure would greatly reduce the amount of minerals at the site available for mining. Another option that does not so severely impact the project objectives would be to create habitat elsewhere prior to removing the 36-acre patch. Areas that have been mined could be revegetated with some Douglas-fir and enhanced with created Douglas-fir snags (standing dead trees) relocated from cleared areas. These areas in turn could be set aside permanently as habitat areas for this species.

Regulatory/Policy Basis for Condition. King County Policy NE-603.

5.4.3.7 Terrestrial Impact 4 – Reduction in Habitat Meeting “Fish and Wildlife Habitat Conservation Area” Criteria

Specific Adverse Environmental Impact. The shoreline of most of Maury Island, including the site, meets the definition of a King County Fish and Wildlife Conservation Area. Active mining would cause noise and activity that would disturb bald eagles, which are listed as threatened. The use is not expected to significantly affect individuals, as described in Section 5.3.1.1. Mining would also reduce up to 50 percent of the existing bluffs. These areas are considered riparian habitat (and, therefore, meet

the criteria for Fish and Wildlife Habitat Conservation Area) since trees from these bluffs contribute wood and organic material to the shoreline and associated waters.

5.4.3.8 Terrestrial Mitigation 4

To compensate for potential disturbance to bald eagles, establish a perch pole for bald eagles along the shoreline and plant Douglas-fir. The pole should be designed and sited as approved by King County. Protection of an additional portion of the bluffs (as described in Chapter 11) would offset much of the impact from loss of riparian habitat. See also potential mitigation in Chapter 6, which includes habitat enhancement within the 200-foot shoreline buffer.

Regulatory/Policy Basis for Condition. King County Policy NE-604.

5.4.3.9 Terrestrial Impact 5. Impacts due to Herbicide Use

Herbicides can adversely affect the environment by affecting nontargeted plants and animals, such as salmon. In addition, herbicides can enter ground and surface waters.

5.4.3.10 Terrestrial Mitigation 5. Prohibit Herbicide Use

Follow King County policies of Integrated Pest Management for public lands. As of this writing, these policies are still in draft form, but integrated pest management is a proven and accepted approach to controlling weeds.

Regulatory/Policy Basis for Condition. This measure is based on KC policy NE-502, which states:

King County should actively encourage the use of environmentally safe methods of vegetation control. Herbicide use should be minimized.

In addition, since the site is within a groundwater protection special overlay district (KCC 21A.38.150), unrestricted and/or indiscriminate use of herbicides would be imprudent.

5.4.3.11 Terrestrial Impact 6 – Loss of Red-Tailed Hawk Foraging and Potential Nesting Habitat

Specific Adverse Environmental Impact. Active portions of the mine would be reduced in suitability for red-tailed hawk

foraging, and mining would eventually remove mature forest that provides potential future nest sites. Overall, mining would create more suitable foraging habitat, since, once vegetated (even minimally), reclaimed areas would provide good hunting habitat.

5.4.3.12 Terrestrial Mitigation 6

Place artificial perch poles throughout the site to improve foraging habitat values on the site, since red-tailed hawk foraging is often limited by available perches. Placement of artificial nest structures within the buffer would help to offset potential losses of future nesting areas. Similar techniques have been used recently in Surrey, British Columbia, to mitigate direct removal of a red-tailed hawk nest site.

Regulatory/Policy Basis for Condition. King County Policy NE-604.

5.4.3.13 Terrestrial Impact 7 - Destruction of Bird Nests and/or Eggs

Specific Adverse Environmental Impact. The Applicant's proposal does not include measures to avoid disturbing nesting birds. Because of this, the project could result in the direct destruction of bird nests and/or young, including those protected under the Migratory Bird Treaty Act.

5.4.3.14 Terrestrial Mitigation 7

Prohibit vegetation clearing between March 1 and July 15 of any given year (or as otherwise determined through onsite consultation and concurrence with WDFW and/or King County DDES).

Regulatory/Policy Basis for Condition. RCW Title 77.15.130 (Protected fish or wildlife—Unlawful taking), establishes that a person is guilty of unlawful taking of protected fish or wildlife if the person:

... hunts, fishes, possesses, or maliciously kills protected fish or wildlife, or the person possesses or maliciously destroys the eggs or nests of protected fish or wildlife, and the taking has not been authorized by rule of the commission.

WAC Section 232.12.011(3), defines, protected wildlife as:

... all birds not classified as game birds, predatory birds (magpie, crow, starling, House sparrow) or endangered species, or designated as threatened species or sensitive species; ...

Based on these laws, most birds that nest on the site are classified as protected wildlife and, therefore, their nests containing eggs and/or young are protected by law.

Active nests containing young or eggs of many birds are also protected under the Federal Migratory Bird Treaty Act, which prohibits taking, killing or possessing migratory birds, including nest sties. As with “protected wildlife” under Washington Law, “migratory birds” under federal law include most species that breed at the site.

5.5 Cumulative Impacts

Gradual removal of most forest stands on the site would continue the trend of deforestation on Maury Island and elsewhere in King County. Because the site is on a relatively small island, the loss of forest represents a greater proportion of available habitat than would occur on mainland sites. Unlike some other types of development, however, this proposal involves revegetation as each segment of mining is completed.

Prior to reclamation, the greatest impact due to the loss of woodland would be to animals that require a lot of space and cover, such as bear and deer. Other species, such as pileated woodpecker, screech owl, weasels, skunks, and coyotes, would also lose the protective cover of the forest.

In addition, development within King County and elsewhere has resulted in conflicts between people and animals, with deer browsing in gardens and bears entering neighborhoods. Development of the site probably would not cause any major conflicts on its own, but it would add to the causes of such conflicts.

Forests are expected to continue to decline on the island as development continues as zoned. Since much of the mine would be reforested subsequent to mining, the loss of forest habitat would not be permanent, although it could be long term (up to 50 to 100 years, depending on mining and reforestation rates).

5.6 Significant Unavoidable Adverse Impacts

Mining of the site would reduce madrone forest on the site (Terrestrial Impact 1). If the site were to be mined within 11 years

(which is possible under maximum production), then 139 acres of madrone forest would be converted to relatively barren ground. Restoration per Terrestrial Mitigation 1 would offset some of the impact, but madrone would take time to mature and would not likely attain current mature forest conditions for at least 50 years. Madrone may develop in a patchy distribution in some areas.

Loss of madrone would reduce habitat for a “candidate” priority species, the band-tailed pigeon (Terrestrial Impact 2).

Active and recent mining areas would occupy up to 205 acres if mined within 11 years, not including the area for the dock, and would provide little or no wildlife habitat. A longer mining schedule would decrease the area affected, since mined out areas would have a chance to recover before the entire site is cleared. Certain individual animals would no longer use the site and would either perish onsite or move to other areas. Animals that move to other areas (1) are likely to have lower survival and reproductive success, and (2) may affect survival and reproductive success of animals already occupying offsite habitat.

Impacts would be at the scale of individuals and would not threaten populations, although should the site be mined quickly, one of the largest remaining madrone forests (and associated wildlife habitat) on Maury Island would be lost.

Habitat values would remain relatively unchanged within buffers. For about the first 10 to 20 years, reclaimed areas would provide habitat for species associated with shrubby habitats, including lizards, snakes, deer mice, Columbian-black tailed deer, sparrows, towhees, and swallows. Restored forests would not provide habitat for warblers, woodpeckers, and other species associated with more mature forests for at least 25 years.

The site would continue to support wildlife communities that are not present within developed residential areas and, therefore, would continue to support native wildlife and biodiversity on the Island.

5.7 Citations

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Table 5-1. Proposed Action – Effect on Site Vegetation

<i>Vegetation Type</i>	<i>Madrone Status</i>	<i>Area in 50-foot Wide Perimeter Buffer (acres)</i>	<i>Area in 200-foot Wide Shoreline Buffer (acres)</i>	<i>Area to be Mined (acres)</i>	<i>Total Area (acres)</i>
Bluff madrone forest	Dominant tree	0.0	13.3	16.7	30.0
Madrone mixed forest	Dominant tree	6.4	0.0	88.2	94.6
Douglas-fir mixed forest	Codominant tree	2.7	0.0	33.6	36.3
Old mine	Codominant shrub	0.1	2.9	38.9	42.0
Shrubland	Minor	1.0	3.9	27.2	32.1
		10.3	20.1	204.6	235.0